

**U.S. Department of the Interior  
Bureau of Land Management**

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**Environmental Assessment  
DOI-BLM-AZ-P030-2013-0001-EA  
November 2015**

**Box Bar Allotment  
Indian Creek Riparian Management**

Agua Fria National Monument  
21605 North 7<sup>th</sup> Avenue  
Phoenix, AZ 85027  
Phone: (623) 580-5500  
Fax: (623) 580-5580



# Indian Creek Riparian Management

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1. Introduction.....	2
1.1 Purpose and Need for Action .....	3
1.2 Decision to be Made.....	3
1.3 Land Use Plan Conformance.....	4
1.4 Scoping & Public Participation .....	5
1.5 Issues Identified.....	5
2. Alternatives .....	9
2.1 Design features and Standard Operating Procedures Common Throughout All Relevant Alternatives .....	9
2.2 Alternative One - Proposed Action .....	10
2.3 Alternative Two – Water development .....	13
2.4 Alternative Three – Livestock Exclusion from Indian Creek .....	15
2.5 Alternative Four - No Grazing .....	16
2.6 Alternative Five - No Action.....	16
2.7 Alternatives Considered but Removed from Detailed Analysis .....	16
3. Affected Environment & Environmental Consequences .....	16
3.1 Definition of Terms.....	16
3.2 Analysis of Resources .....	17
3.3 Biological Resources.....	19
3.4 Rangeland Management .....	26
4. Cumulative Effects.....	28
4.1 Cumulative Effects Study Area.....	28
4.2 Cumulatively Connected Actions.....	28
5. Parties Consulted .....	30
6. List of Preparers.....	30
7. References.....	30

## 1. INTRODUCTION

This proposed project is located along Indian Creek in the Agua Fria National Monument (AFNM) T. 11 N., R. 3 E., Sections 25, 26, 35 and 36. The reach of Indian Creek that is located within the project area is designated as critical habitat for the endangered Gila chub (*Gila intermedia*). The Bureau of Land Management (BLM) consulted with the US Fish and Wildlife Service (Service) on the Existing Phoenix Field Office Planning Decisions and Associated Activities on Gila chub and its critical habitat (Biological Opinion 02-21-05-F-0409). Management actions covered under this Biological Opinion (BO) allow for livestock grazing from November 1 through March 1 in pastures that contain Gila chub critical habitat as long as threshold levels of bank alteration (not to exceed 25%), woody riparian species utilization (not to exceed 30%) and herbaceous riparian utilization (not to exceed 50%) are not exceeded.

However, these thresholds have been routinely met or exceeded within a few weeks of livestock use in Indian Creek (Table 1). Excessive stream bank alteration and overutilization can reduce habitat quality for Gila chub. In 2011, the stream was assessed as functional at risk by the BLM interdisciplinary (ID) team. The rationale for this rating was that the system was not vertically stable, there was little recruitment of riparian tree species, and there was excessive erosion. Herbaceous stream bank vegetation cover was sparse in places; however, vegetative cover was much greater within a livestock exclosure that currently exists on Indian Creek.

Table 1. Dates when threshold values of stream bank alteration (25%) and/or riparian vegetation utilization (50% herbaceous, 30% woody species) were met or exceeded during the November 1 – March 1 allowable season of use.

Season of use year (November - March 1)	Dates when impact thresholds were met or exceeded	Threshold levels met or exceeded
2008 - 2009	December 10, 2008	34% bank alteration
2009 - 2010	November 13, 2009	>25% bank alteration
2010 - 2011	January 20, 2011	30% bank alteration; 58% riparian herbaceous vegetation utilization
2011 - 2012	November 21, 2011	61% bank alteration
2012 - 2013	October 17, 2012	23% bank alteration – occurred outside of allowable season of use. Lessee trespassed for non-compliance with terms and conditions of the permit and had to move their cattle from the pasture. No further use of pastures within critical habitat was allowed in the 2012 – 2013 winter season of use.
2013-2014	November 19, 2013	40% bank alteration; 42% woody species utilization
2014-2015	October 31, 2014	30% bank alteration – occurred outside of allowable season on use. Lessee was asked to remove their cattle from the pastures associated with Indian Creek. No further use of the pastures with critical habitat was allowed in the 2014-2015 grazing season.

This reach of Indian Creek is located within the Box Bar allotment. The allotment is comprised of 10,356 acres of BLM-administered public land, 1,928 acres of state land, and 100 acres of private land. The Box Bar allotment is located between the Prescott National Forest and Interstate 17, southeast of Cordes Junction in Yavapai County, Arizona. The allotment is shown in Figure 1.

BLM consulted with the Service on the effects of this proposed action on Gila chub and its critical habitat and conference on the effects of this proposed action on the federally threatened yellow-billed cuckoo (*Coccyzus americanus*).

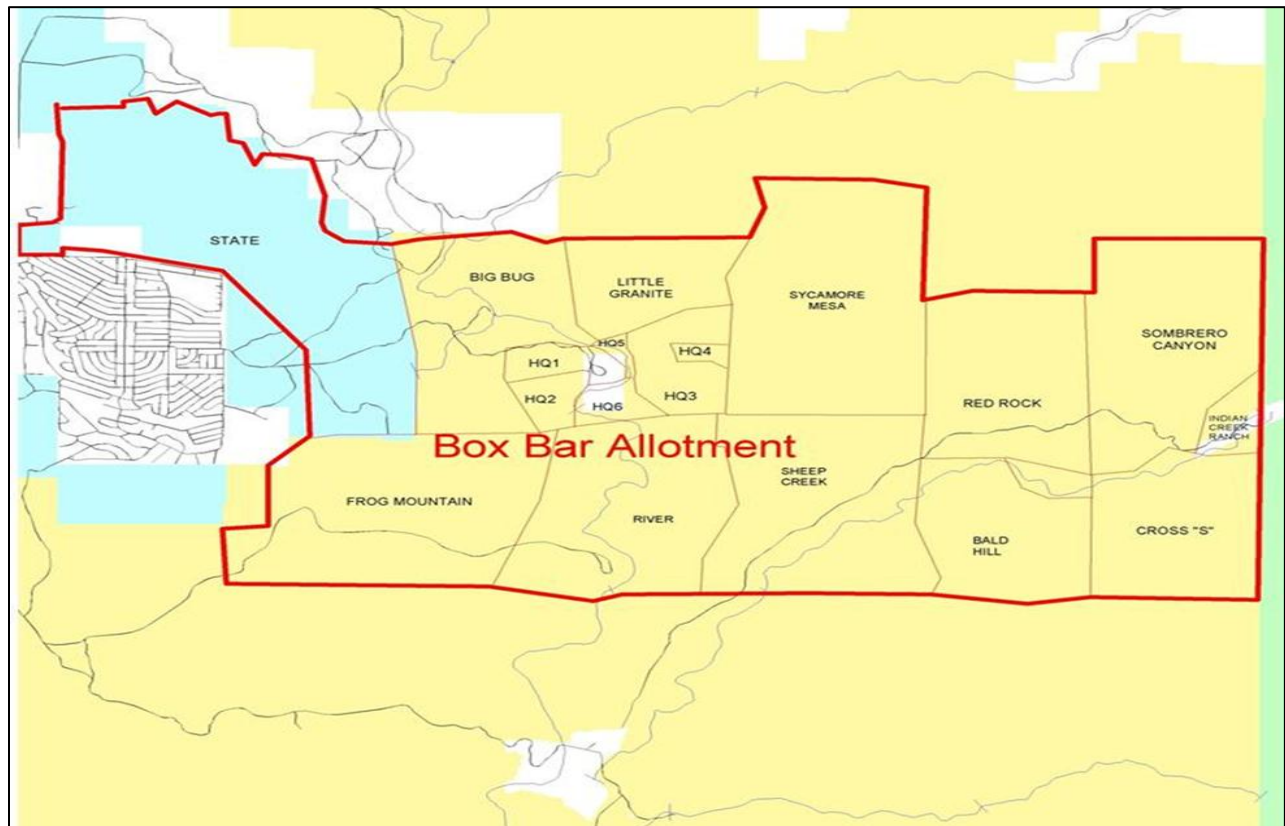
### 1.1 Purpose and Need for Action

The purpose of this action is to reduce livestock impacts on Indian Creek critical habitat in order to improve habitat conditions for Gila chub. The need for this action is that threshold impacts specified in the BO are routinely met or exceeded within a few weeks of grazing use which puts BLM out of compliance with the BO and the Endangered Species Act.

### 1.2 Decision to be Made

The decision to be made is whether to implement the proposed action, the alternative actions, or to continue current management.

Figure 1. Map of the Box Bar Allotment showing pastures and land ownership (yellow = BLM, Blue = State of Arizona, White = Private, Green = Forest Service).



### **1.3 Land Use Plan Conformance**

The proposed action conforms to the following Agua Fria National Monument Resource Management Plan decisions:

TE-18. Stream bank alteration due to recreation activities and livestock grazing in areas occupied by Gila topminnow, Gila chub, and desert pupfish will be limited to 25 percent annually.

TE-19. Domestic livestock utilization of native riparian trees seedlings along streams occupied by Gila chub, Gila topminnow, and desert pupfish will be limited to 30 percent of the apical stems per growing season.

VM-1. Maintain, restore, or enhance the diversity, distribution, and viability of populations of native plants, and maintain, restore, or enhance overall ecosystem health.

RP-1. Riparian areas will include a plant community that consists of stream banks dominated (> 50 percent) by native species from the genera *Scirpus*, *Carex*, *Juncus*, and *Eleocharis*. The size class distribution of native riparian obligate trees will be > 15 percent seedlings, > 15 percent mid-size, and > 15 percent large size (depending on existing conditions and the site potential). Size classes are defined as follows:

- Seedlings are < 1 inch in basal diameter.
- Mid-sizes are 1 to 6 inches in basal diameter.
- Large sizes are > 6 inches in basal diameter.

LH-2. Riparian-wetland areas are in properly functioning condition.

LH-3. Productive, diverse upland and riparian-wetland plant communities of native species exist and are maintained.

GM-2. Watersheds are in properly functioning condition, including their upland, riparian, and aquatic components. Soil and plant conditions support infiltration, storage, and release of water that are in balance with climate and landform.

GM-3. Ecological processes are maintained to support healthy biotic populations and communities.

GM-11. Rest-rotation, deferred-rotation, seasonal or short-duration use, or other management systems may be implemented where needs are identified through monitoring. Monitoring will be used to assess the effectiveness of changes brought about by the new management practices.

GM-12. Range improvements needed for proper management of the grazing program will be determined and completed, including repair and/or installation of fences, cattle guards, and water developments.

GM-16. Apply management actions outlined in the Arizona Standards for Rangeland Health and Guidelines for Grazing Administration (Land Health Standards) to recognize and correct potential erosion problems that could degrade other resources, with prioritized emphasis on sites

that might directly affect species that have been listed as threatened, endangered, or candidate by the US Fish and Wildlife Service.

#### 1.4 Scoping & Public Participation

This project was publicly scoped by posting a scoping letter on the BLM website for 30 days and sending letters or emails to all individuals and organizations on our interested publics list. Comments were received from Western Watersheds Project and the Arizona Game and Fish Department (AGFD). This proposed project was also scoped internally with the Agua Fria National Monument Natural Resource Specialist, Biologist, and Manager. This project was also introduced and discussed at the BLM Phoenix District monthly ID team meeting. Site visits and subsequent scoping and collaboration took place with the Agua Fria National Monument Natural Resource Specialist and Biologist. BLM staff met with the grazing lessee for the Box Bar allotment and discussed the proposed action. Another site visit with the lessee and BLM staff took place to discuss potential livestock crossing areas. External scoping also took place with AGFD in a site visit to Indian Creek with the AGFD Region VI Nongame Biologist and Habitat Specialist.

#### 1.5 Issues Identified

Table 2. Internal Resource Issues Summary

Issues	How issues are addressed
<ul style="list-style-type: none"> <li>• <i>Cultural Resources</i></li> <li>• What would be the impacts to cultural resources?</li> </ul>	See <b>Design features and Standard Operating Procedures Common Throughout All Relevant Alternatives – Cultural Section</b>
<ul style="list-style-type: none"> <li>• <i>Fish/Wildlife, Migratory Birds</i></li> <li>• What would be the impacts to migratory birds and their habitat?</li> </ul>	<ul style="list-style-type: none"> <li>• See <b>Affected Environment and Environmental Consequences</b> in the <b>Biological Resources – Wildlife and Fisheries</b> sections.</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Fish/Wildlife, Migratory Birds</i></li> <li>• What would be the impacts to terrestrial upland species that use riparian habitat for a portion of their habitat needs?</li> </ul>	<ul style="list-style-type: none"> <li>• See <b>Affected Environment and Environmental Consequences</b> in the <b>Biological Resources – Wildlife and Fisheries</b> sections.</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Livestock Grazing</i></li> <li>• What would be the impacts to available livestock forage?</li> </ul>	<ul style="list-style-type: none"> <li>• See <b>Affected Environment and Environmental Consequences</b> in the <b>Rangeland Management</b> sections and <b>Table 4</b>.</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Livestock Grazing</i></li> <li>• What would be the impacts to available livestock watering sources?</li> </ul>	<ul style="list-style-type: none"> <li>• See <b>Affected Environment and Environmental Consequences</b> in the <b>Rangeland Management</b> sections and <b>Table 4</b>.</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Livestock Grazing</i></li> <li>• How would the season of use change among each of the alternatives?</li> </ul>	<ul style="list-style-type: none"> <li>• See the <b>Proposed Action and Alternatives</b> sections and <b>Table 4</b>.</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Livestock Grazing</i></li> </ul>	<ul style="list-style-type: none"> <li>• See <b>Affected Environment and Environmental</b></li> </ul>

<b>Issues</b>	<b>How issues are addressed</b>
<ul style="list-style-type: none"> <li>How would the various alternatives affect the ability to move cattle in the analysis area?</li> </ul>	<b>Consequences in the Rangeland Management</b> sections.
<ul style="list-style-type: none"> <li><i>Special Status Species</i></li> <li>What would be the impact to Gila chub and its habitat?</li> </ul>	<ul style="list-style-type: none"> <li>See <b>Affected Environment and Environmental Consequences in the Biological Resources – <i>Special Status Species</i></b> sections.</li> </ul>
<ul style="list-style-type: none"> <li><i>Special Status Species</i></li> <li>What would be the potential impacts to yellow-billed cuckoo and its habitat?</li> </ul>	<ul style="list-style-type: none"> <li>See <b>Affected Environment and Environmental Consequences in the Biological Resources – <i>Special Status Species</i></b> sections.</li> </ul>
<ul style="list-style-type: none"> <li><i>Special Status Species</i></li> <li>What would be the impacts to the BLM Sensitive species that occupy habitat in the project area (longfin dace, desert sucker, and lowland leopard frog)?</li> </ul>	<ul style="list-style-type: none"> <li>See <b>Affected Environment and Environmental Consequences in the Biological Resources – <i>Special Status Species</i></b> sections.</li> </ul>
<ul style="list-style-type: none"> <li><i>Wetlands/Riparian</i></li> <li>What would be the impacts to stream bank vegetative cover, recruitment of native riparian tree species, bank stability and channel erosion?</li> </ul>	<ul style="list-style-type: none"> <li>See <b>Affected Environment and Environmental Consequences in the Biological Resources – <i>Riparian Resources</i></b> sections.</li> </ul>
<ul style="list-style-type: none"> <li><i>Monument Objects</i></li> <li>What are the impacts to monument objects?</li> </ul>	<ul style="list-style-type: none"> <li>See <b>Affected Environment and Environmental Consequences in the Biological Resources – <i>Riparian Resources</i></b> sections.</li> <li>See <b>Affected Environment and Environmental Consequences in the Biological Resources – <i>Wildlife and Fisheries</i> and <i>Special Status Species</i></b> sections</li> <li>See <b>Design features and Standard Operating Procedures Common Throughout All Relevant Alternatives – <i>Cultural Section</i></b></li> </ul>

Table 3. Public Scoping Issues Summary

<b>Issue</b>	<b>How issues are addressed</b>
Suggestion that the BLM should consider full riparian exclosure and full pasture closure.	These are alternatives addressed in this EA

Issue	How issues are addressed
Suggestion that the BLM should analyze and disclose whether the uplands will be able to support the authorized use on the allotments without the riparian pastures.	Alternative three considers a reduced stocking rate in order to ensure that rangeland health would be maintained without the use of the riparian pastures.
Suggestion that the impacts of exclosure fencing should be thoroughly assessed.	Impacts of the exclosure fencing are assessed in this EA.
Suggestion that the relative amount and expense of fencing under each alternative should be disclosed.	Estimates of the amount and costs of fencing for each alternative are summarized in <b>Table 5</b> .
Suggestion that the BLM should assess impacts to water quality of each of the alternatives, discussing the stream crossing impacts of cattle to sediment, bacterial loads, etc.	Relative impacts to water quality across all alternatives are assessed in this EA.
Suggestion that the upland health conditions of the allotments should be revealed, since this also affects Gila Chub habitat.	Recommendation is outside of the scope of the purpose and need.
Suggestion that the history of livestock impacts and prior years' monitoring should also be disclosed so that the reader can understand the cumulative effects of future impacts.	A summary of the history of riparian monitoring in the critical habitat reach of Indian Creek is provided in Tables 6 and 7.
Suggestion that a full and hard look at the socioeconomic and ecological reality of livestock grazing on the affected allotments should be included.	The EA will disclose economic impact of the fencing cost across all alternatives (Table 5). No other specific socioeconomic issues have been identified to either drive alternatives development or inform impacts.
Suggestion that each alternative should be assessed for viability within the paradigm of the monument designation	Impacts to monument objects from each of the alternatives are addressed in this EA (Table2, <i>Monument Objects</i> ).
Statement that: [during recent visits] “We (Arizona Game and Fish Department, Mesa Region) observed significant differences between reaches currently excluded from grazing versus open. We noted significant levels of sedimentation in pools, lack of overhanging canopy cover in reaches downstream of existing exclosure, algal growth, stream bank trampling, lack of riparian tree recruitment and high utilization levels on deer grass and riparian woody species.	Comment and information provided is considered in the impacts analysis of the no action alternative, Proposed Action, Alternative Three, and Alternative Four.
Statement that: “Reaches inside of exclosure had greater canopy cover of deer grass in particular, in addition to signs of recent riparian tree recruitment.”	Comment and information provided will be considered in the impacts analysis of the Proposed Action, Alternative One, Alternative Two and Alternative Three.



Issue	How issues are addressed
Statement that: “We (Arizona Game and Fish Department, Mesa Region) recommend: Development of alternative water sources for livestock in the pasture in lieu of pumping water from Indian Creek to upland storage/troughs, in order to avoid loss of water in the stream system.”	The Proposed Action and the Alternatives do not propose to pump water from Indian Creek to upland storage or troughs.
Statement that: “This concern [concern for loss of water from Indian Creek] is of particular importance given the extremely low flows and shallow depths typical in this system.”	Comment and information provided by the state wildlife agency was considered during the formation of alternatives and is considered in the impacts analysis of Alternative One.
Statement that: “Or alternatively: construction of ‘water gaps’ or streamside crossings at a few locations where bedrock and/stream bank geology would be more resistant to livestock impacts.”	Comment and information provided by the state wildlife agency was considered during the formation of alternatives and is considered in the impacts analysis of the Proposed Action and Alternative One.
Recommendation that: “Timing of livestock use of this pasture during the winter season when water needs are the lowest, and flow regimes are potentially the highest.”	Recommendation is considered in the No Action alternative.
Recommendation that: “Evaluation of upland conditions and trends; and management actions that increase ground cover and reduce soil erosion. Sedimentation impacts to the stream do not solely originate from streamside conditions.”	Recommendation is outside of the scope of the purpose and need.
Recommendation that: “Consider implementation of riparian restoration activities within the exclosures to reestablish stream bank cover with native grasses, sedges or rushes; and pole plantings or native riparian trees or shrubs to increase overhanging canopy cover. These actions would help reduce sedimentation, increase stream channel stability, lower stream temperatures, and increase wildlife habitat quantity and quality.”	Recommendation is an alternative and is presented in <b>Alternatives Considered but Removed from Detailed Analysis section.</b>
Recommendation that BLM & US Forest Service “make a coordinate effort on improving riparian habitat conditions along Indian Creek.”	BLM will share information and data with the Prescott National Forest on the effects of management on riparian habitat conditions in Indian Creek.
Lack of support of riparian livestock grazing throughout the AFNM	Comment noted
Recommendation that the BLM “retire those existing pastures which contain the riparian areas”.	Recommendation is considered in Alternative Three.

Issue	How issues are addressed
Concern that the enclosure fence will be difficult to maintain in the stream and tributary channels.	<p>The proposed action includes the following conservation measures:</p> <ul style="list-style-type: none"> <li>• The enclosure fence will be inspected and repaired, if necessary, prior to turning cattle out into pastures containing Gila chub critical habitat.</li> <li>• The water gap fences will be inspected and repaired, if necessary, after flood events when cattle are in pastures containing Gila chub critical habitat.</li> <li>• The enclosure fence will be inspected twice per year when cattle are present in the pastures containing Gila chub critical habitat.</li> <li>• The enclosure fence and water gap inspections will be requirements added to the terms and conditions of the grazing lessee's permit.</li> </ul>
Recommendation that: the criteria for locating the fence line not be to maximize the amount of the uplands the lessee can continue to graze, but to locate them where they will continue to be effective for a long time with little maintenance.	This issue is addressed in the proposed action.

## 2. ALTERNATIVES

### 2.1 Design features and Standard Operating Procedures Common Throughout All Relevant Alternatives

#### 2.1.1 Cultural Resources

All impacts to cultural resources shall be avoided, thus preventing potential adverse effects from occurring. The proposed enclosure fences and water developments have been surveyed by a qualified BLM archaeologist to a class III level. No cultural resources were found in the proposed locations and would not be impacted by the proposed action or alternatives.

#### 2.1.2 Biological Resources

Construction would take place between October 1 and April 30 to avoid impacts to spawning Gila chub, nesting yellow-billed cuckoo and other migratory birds.

The BLM would continue to monitor the effects of management actions in the Indian Creek riparian area. Within the Indian Creek riparian area is a Multiple Indicator Monitoring (Burton et al. 2011) study area that the BLM uses for quantitative and qualitative monitoring of riparian conditions. There are also several Proper Functioning Condition (Prichard et al. 1998) sites located in the riparian area the BLM uses to monitor riparian function and condition (Table 5).

The BLM would also continue to study the upland areas of the allotment at various Assessment, Inventory, and Monitoring (AIM) locations (Taylor et al 2014).

## **2.2 Alternative One - Proposed Action**

A four-strand barbed wire fence with a smooth bottom wire would be constructed to exclude livestock from an approximate 1.6 mile reach of critical habitat in Indian Creek (Figures 1 and 2). This fence would adjoin an existing fenced area that currently excludes livestock from 0.7 miles of Indian Creek (Figure 2). The proposed fence would be built in the upland habitat near the stream and would run roughly parallel to the stream. Break-away (water gap) fences would be installed where the fence crosses the stream. Drilling may be required to set posts in bedrock areas – especially when constructing water gap fences. Hand drills would be used for drilling. Two crossing areas would be constructed to allow livestock to cross from one pasture to another and for livestock watering (Figure 3). The crossings would consist of two parallel wire fences spanning across the stream, adjoining the exclosure fence in the upland habitat. The crossing areas depicted on the map are located in areas where the stream channel is armored by large rock or bedrock, making these areas more resistant to livestock impacts (Figures 3-5). The width of the crossings would be approximately 60 feet wide. The crossing areas would have gates in the upland habitat so that the crossings could be closed when they are not in use or when the water gap fences are damaged.

Once the exclosure is constructed, livestock would have access to upland vegetation in adjacent pastures and minimal access to critical habitat within the riparian area. The designation of the Bald Hill and Cross S pastures would change from riparian pastures to upland pastures, making them available year round to livestock grazing without seasonal use restrictions. Once the exclosure fence and water gaps would be constructed, livestock would be permanently excluded from approximately 98% of the critical habitat and the associated riparian habitat.

The exclosure fence will be inspected and repaired, if necessary, prior to turning cattle out into pastures containing Gila chub critical habitat by the lessee. The water gap fences will also be inspected and repaired, if necessary, after flood events when cattle are in pastures containing Gila chub critical habitat by the lessee. The exclosure fence will be inspected twice per year when cattle are present in the pastures containing Gila chub critical habitat. The exclosure fence and water gap inspections will be requirements added to the terms and conditions of the grazing lessee's lease. To avoid impacts to spawning Gila chub and nesting yellow-billed cuckoo, construction would take place between October 1 and April 30.

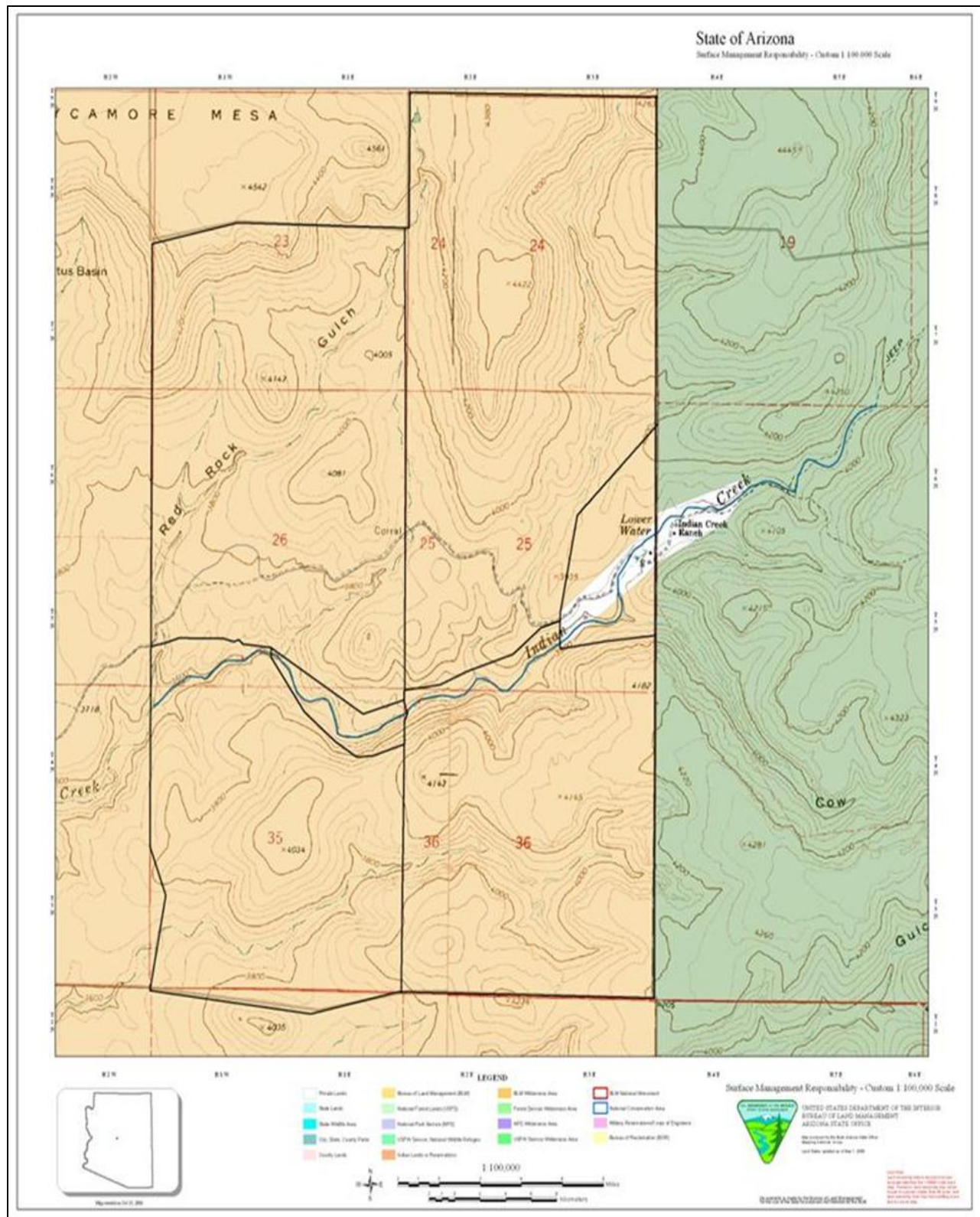


Figure 2. Map of the project area. Existing pasture fences are depicted by black lines. Gila chub critical habitat is depicted by the blue line.

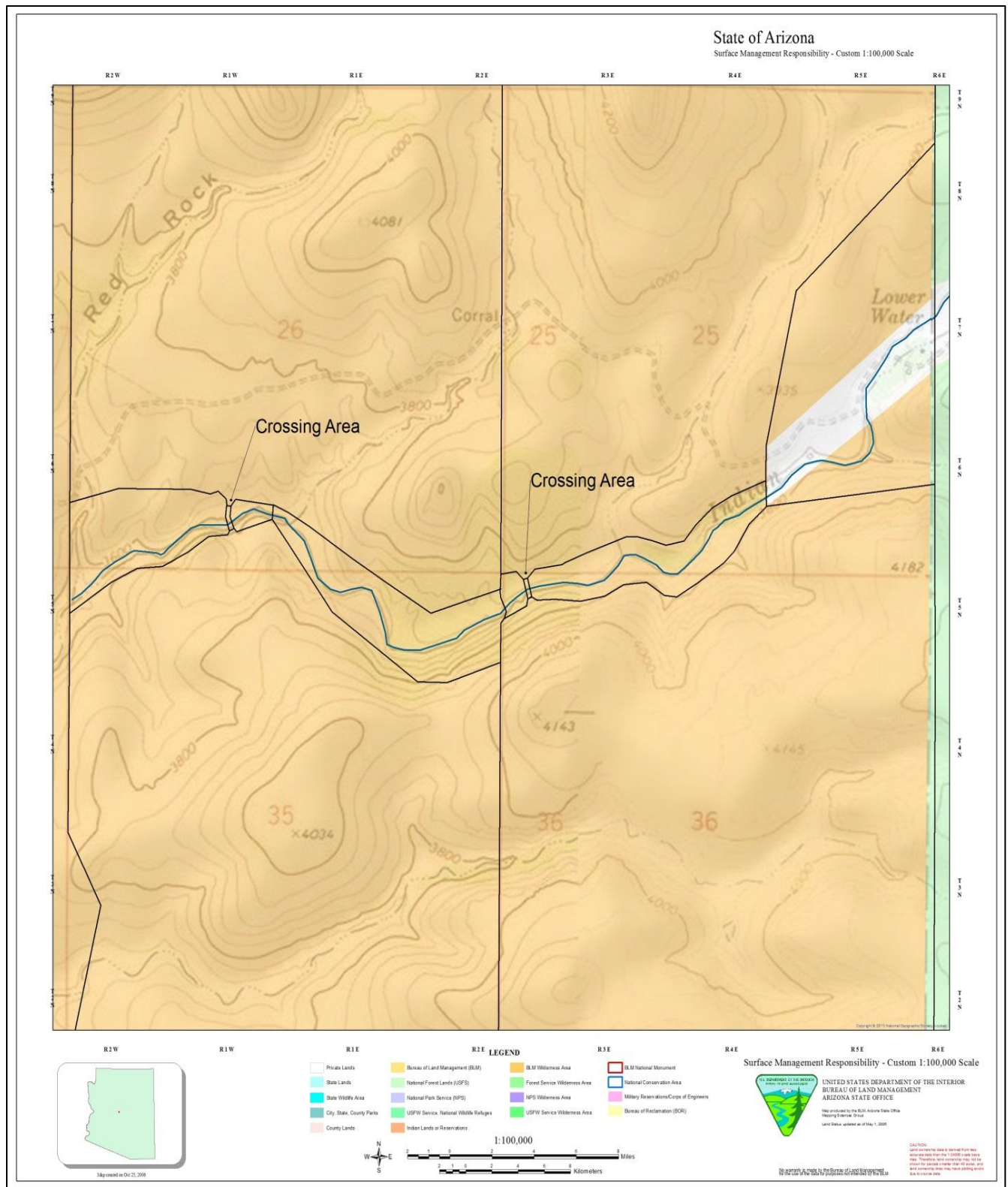


Figure 3. Proposed livestock exclosure (black lines) around Indian Creek critical habitat. The two proposed crossing areas are also shown on the map. Gila chub critical habitat is depicted by the blue line.





Figure 4. Photo of the proposed downstream crossing area (intermittent reach - dries in summer).



Figure 5. Photo of the proposed upstream crossing area (perennial reach).

### 2.3 Alternative Two – Water development

Alternative Two is identical to the proposed action with the addition of a water development near the most downstream of the crossings (Figure 6). The water development would divert surface water from an unnamed tributary of Indian Creek through a pipeline into a trough. The diversion

**State of Arizona**  
Surface Management Responsibility - Custom 1:100,000 Scale

**Red Rock**  
**Lower Water**

**Crossing Area**  
**Diversion**  
**Trough**

**LEGEND**

Private Lands	Minerals of Land Management (BLM)	BLM Wilderness Area	BLM National Monument
State Lands	National Forest Lands (USFS)	Forest Service Wilderness Area	National Conservation Area
Native Wildlife Area	National Park Service (NPS)	NPS Wilderness Area	Military Reservation Corps of Engineers
City, State, County Parks	USFWS Service National Wildlife Refuge	USFWS Service Wilderness Area	Service of Reclamation (BOR)
County Lands	Indian Lands or Reservations		

**Scale**  
1:100,000  
Miles  
Kilometers

**Surface Management Responsibility - Custom 1:100,000 Scale**  
UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
ARIZONA STATE OFFICE  
Map prepared by the Arizona State Office  
Map Date: 10/10/11  
Map Scale: 1:100,000

14



## 2.4 Alternative Three – Livestock Exclusion from Indian Creek

A four strand barbed wire fence would be constructed to exclude cattle from the entire reach of Indian Creek within the project area (Bald Hill and Cross S pastures) (Figure 7). No crossing areas would be provided. No water would be withdrawn from Indian Creek for livestock use.

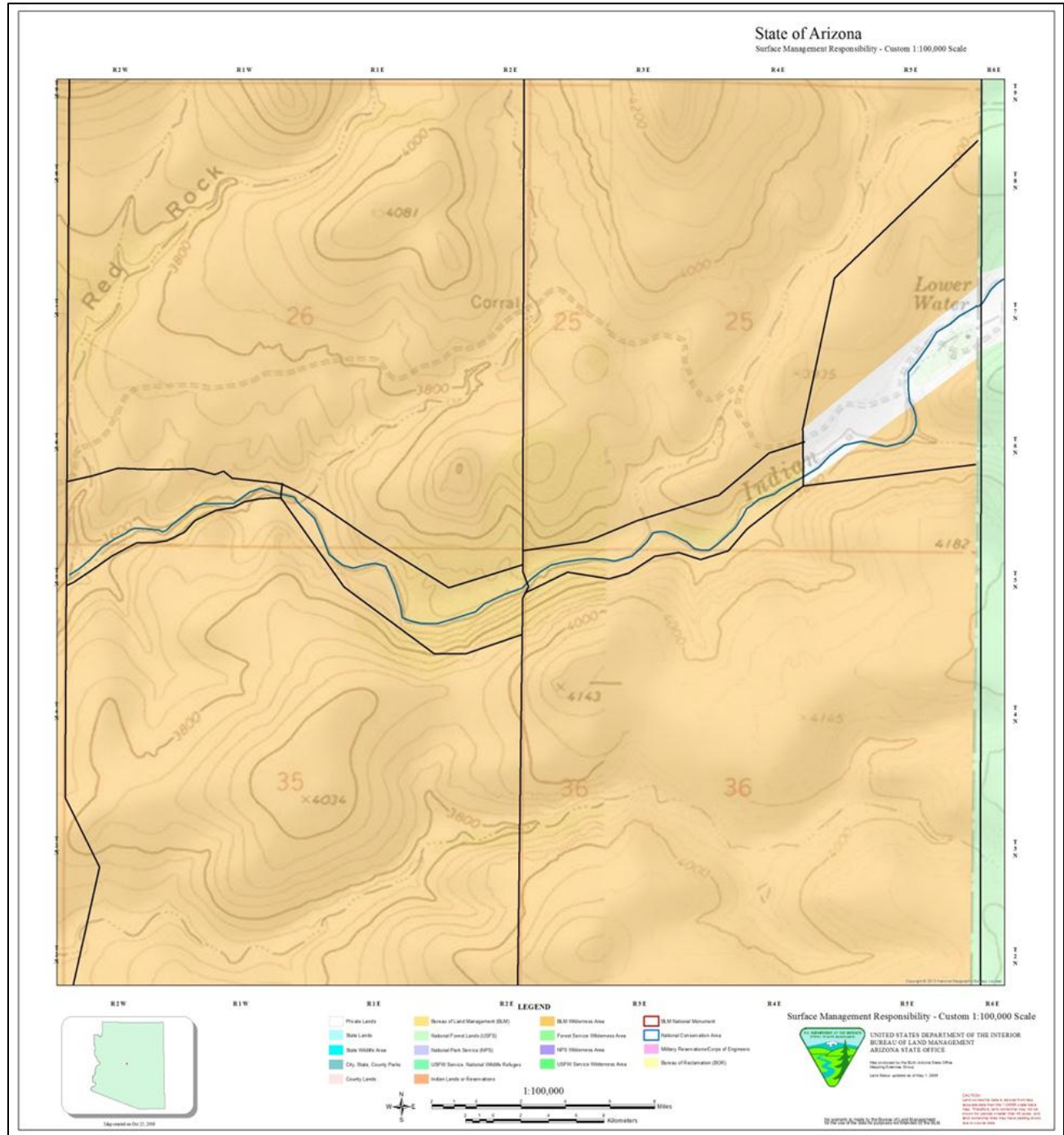


Figure 7. Map of Alternative 3. In this alternative livestock would be excluded from this entire reach of Indian Creek critical habitat (no crossings). Gila chub critical habitat is depicted by the blue line.



## **2.5 Alternative Four - No Grazing**

Alternative four would administratively close the Bald Hill and Cross S pastures (approximately 1,962 acres) to livestock grazing. These pastures would be removed from the grazing authorization in the Box Bar Allotment. 464 Animal Unit Months (AUMs) associated with these pastures would be placed in temporary suspended use until the US Fish and Wildlife Service determines grazing within Indian Creek would be in harmony with the guidelines set for Gila chub habitat.

## **2.6 Alternative Five - No Action**

The no action alternative is the current management situation where cattle have access to Indian Creek critical habitat from November 1 through March 1, or until one or more of the threshold impacts set in the BO are met or exceeded.

## **2.7 Alternatives Considered but Removed from Detailed Analysis**

As a result of scoping, one additional alternative was suggested. The recommendation proposed riparian restoration activities within the proposed riparian exclosures. Pole planting of riparian trees and the planting of native grasses and sedges would increase the number of trees and ground cover within the exclosures. However, both woody species and ground cover are adequate to support recolonization of riparian obligate vegetation recruitment within the riparian areas of Indian Creek. If built, the riparian exclosures would remove the effects of livestock to riparian vegetation. This would result in an immediate (one growing season) increase in vegetation recruitment and ground cover which would reduce sedimentation, increase stream channel stability lower stream temperature, and increase wildlife habitat quantity and quality. Ground disturbing effects of conducting pole and herbaceous vegetation planting would likely offset the benefits of restoration activities relative to unassisted, natural recovery and the long term impacts would be substantially similar to the action alternatives listed above. Thus, this proposed action has been removed from further analysis.

# **3. AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES**

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This section describes the existing condition of the potentially impacted resources and how they would or might be affected by the proposed action and alternatives.

## **3.1 Definition of Terms**

**Adverse:** The effect is negative on a particular resource or a number of resources. In this document, the term impact is assumed to be adverse unless otherwise stated.

**Beneficial:** The effect is positive effects on a particular resource or a number of resources.

**Direct:** The effect which is caused by the action and occur at the same time and place.

**Indirect:** The effect which is caused by the action and is later in time or farther removed in distance, but still reasonably foreseeable. Indirect effects may include growth-inducing effects, and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on water and air and other natural systems, including ecosystems.

**Cumulative:** Effects that result from the incremental effect of an action when considered with other past, present, and reasonably foreseeable future actions.

**Negligible:** The effect is at the lower level of detection; change would be difficult to measure.

**Minor:** The effect might result in a slight but detectable change but would not be expected to have an overall effect.

**Moderate:** The effect would likely result in a measureable change and could have an appreciable effect.

**Major:** The effect would likely result in a substantial change.

**Short-Term:** The effect occurs only for a short-time (during construction) after implementation of the action.

**Long-Term:** The effect occurs for an extended period (more than 5 years) after implementation of the action.

### 3.2 Analysis of Resources

See Table 4 for resource analysis and rationale for detailed analysis:

Table 4 Resources and rationale for detailed analysis

Resource	Not Present	Present, Not Affected	Present, May Be Affected	Rationale
Air Quality	X			The Clean Air Act of 1970 and subsequent amendments required the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS), which specify maximum levels for six criteria pollutants: carbon monoxide, nitrogen dioxide, ozone, particulate matter (PM), sulfur dioxide, and lead. Livestock operations have the potential to release fugitive dust (PM) and carbon monoxide associated with cattle trailing, range improvements, and vehicle use. Yavapai County is classified by EPA as “attainment” for the purposes of NAAQS; therefore further analysis is not necessary for this assessment.

Resource	Not Present	Present, Not Affected	Present, May Be Affected	Rationale
Areas of Critical Environmental Concern	X			No Areas of Critical Environmental Concern are present within the project area.
Cultural Resources		X		All cultural resources would be avoided, thus, no impact to cultural resources (monument objects) would occur.
Environmental Justice	X			None of the alternatives would disproportionately impact any low income of minority populations as described in Executive Order 12898.
Farmlands (Prime and Unique)	X			Under the <i>Farmland Protection Act</i> of 1981, Federal agencies seek to minimize the unnecessary or irreversible conversion of farmland to nonagricultural uses. No unique or prime farmlands exist within the project area; therefore, there would be no impact on this resource (BLM 2007, p. 437).
Floodplains	X			EO 11988, <i>Floodplain Management</i> (1977) and EO 11990, <i>Protection of Wetlands</i> (1977), require all Federal agencies to avoid construction within the 100-year floodplain unless no practicable alternative exists, and to minimize the destruction, degradation, or loss of wetlands. The proposed action and alternatives do not result in any impacts to floodplains or wetlands.
Monument Objects			X	Avoidance of impacts to monument objects (biological and cultural resources) have been evaluated in this EA. Common to all alternatives; there would be no impacts to cultural resource related monument objects through complete avoidance. Direct and indirect impacts to biological monument objects are evaluated in sections 3.1-3.3 and 4.2 of this EA.
Native American Religious Concerns	X			EO 13007, requires Federal agencies to (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and (2) avoid adversely affecting the physical integrity of such sacred sites. No known sacred sites are present in the project area.

Resource	Not Present	Present, Not Affected	Present, May Be Affected	Rationale
Non-native Invasive and Noxious Species		X		Though Non-native Invasive and Noxious Species occur within close proximity to the project area, management changes are not likely to increase the presence of these species over current levels.
Rangeland Management			X	See Section 3.4 for more information.
Wastes (Hazardous and Solid)	X			No known hazardous or solid waste issues occur in the allotment (BLM 2007 p. 437).
Water Quality (Surface and Ground)			X	The Arizona Department of Environmental Quality has not listed any water quality issues or impaired waters within the Box Bar Allotment. However, water quality is addressed in sections 3.3.
Wetlands and Riparian Zones			X	See Sections 3.3 and 4.3 for more information.
Wild and Scenic Rivers	X			No Wild and Scenic Rivers occur within the project area.
Wilderness	X			No wilderness occurs within the project area.
Wildlife and Fish, including Threatened and Endangered Species, Special Status Species, and Migratory Birds			X	See Sections 3.3 and 4.3 for more information.

### 3.3 Biological Resources

#### 3.3.1 Affected Environment - Biological Resources

##### 3.3.1.1 Riparian Resources

Riparian vegetation present at Indian Creek includes velvet ash (*Fraxinus velutina*), Goodding's willow (*Salix gooddingii*), Arizona sycamore (*Platanus wrightii*), Fremont cottonwood (*Populus fremontii*), bulrush (*Schoenoplectus pungens*), and spikerush (*Eleocharis palustris*). Evidence of previous down-cutting is present (steep, eroded banks) in this reach. Riparian trees have been heavily browsed in the past as indicated by the hedged appearance of seedling/saplings. In 2011 the stream was assessed as functional at risk by the BLM ID team (Table 5). The rationale for this rating was that the system was not vertically stable in portions of the reach, and there was

little recruitment of riparian tree species. Herbaceous stream bank vegetation cover was sparse in places; however, vegetative cover was much greater within the existing livestock enclosure.

Riparian vegetation also exists along an approximately 1,200 foot reach of an unnamed tributary to Indian Creek near (upstream of) the proposed lower crossing. Vegetation in this area includes velvet ash, Goodding's willow, bulrush, and spikerush. Surface water in this tributary exists from the confluence with Indian Creek to approximately 900 feet upstream. In the summer, water goes subsurface in a wet meadow at the downstream end of the tributary before reaching Indian Creek.

Table 5. Summary of PFC assessments in the critical habitat reach of Indian Creek.

Date	PFC Assessment Rating
8-1-1995	Functional-at-risk
10-27-1999	Functional-at-risk
11-21-2000	Functional-at-risk
7-17-2003	Functional-at-risk
1-20-2011	Functional-at-risk.

### *3.3.1.2 Special Status Species*

Special status species in and along Indian Creek within the project area include Gila chub (endangered), yellow-billed cuckoo (threatened), lowland leopard frog (*Lithobates yavapaiensis*) (BLM sensitive), longfin dace (*Agosia chrysogaster*) (BLM sensitive) and desert sucker (*Catostomus clarki*) (BLM sensitive).

Lowland leopard frogs have also been observed in the unnamed tributary to Indian Creek near the proposed downstream crossing.

### *3.3.1.3 Wildlife Resources, Migratory Birds and Fish*

The riparian area along Indian Creek is used by a number of fish and wildlife species. Fish present in the creek include Gila chub, longfin dace, and desert sucker. The riparian area is also used by many migratory birds including yellow-billed cuckoo, summer tanager (*Piranga rubra*), yellow warbler (*Dendroica petechia*), Bell's vireo (*Vireo bellii*), and many other species. Garter snakes (*Thamnophis* spp.), canyon treefrog (*Hyla arenicolor*) and lowland leopard frog are also found in and along Indian Creek. Wildlife species that can be found in the surrounding upland areas include but are not limited to pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Dama virginiana*), javelina (*Pecari tajacu*), coyote (*Canis latrans*), mountain lion (*Puma concolor*), black bear (*Ursus americanus*), gray fox (*Urocyon cinereoargenteus*), bobcat (*Lynx rufus*), striped skunk (*Mephitis mephitis*), black-tailed jackrabbit (*Lepus californicus*), cottontail rabbit (*Sylvilagus audubonii*), raccoon (*Procyon lotor*),

western diamond-backed rattlesnake (*Crotalus atrox*) and various other snakes, lizards, small mammals and birds.

### ***3.3.2 Environmental Consequences of the Proposed Action - Biological Resources***

#### ***3.3.2.1 Riparian Resources***

Within the proposed livestock enclosure (an approximate 6,580 foot length of riparian habitat) riparian vegetative cover would likely increase. Recruitment of riparian obligate trees should also increase. With an increase of vegetative cover in the riparian area, stream banks would likely become more stable, reducing erosion and sedimentation, slowing water during high-stream flow events, and building floodplains and increasing water quality and quantity (Belsky et al 1999, Vindon et al. 2010). The proposed crossing areas were selected due to the amount of exposed cobble rock and/or bedrock in the streambed which would reduce the amount of sediment and erosion caused by cattle (or wildlife) while they are accessing the stream. The proposed crossing areas were also chosen due to the limited amounts of vegetation that already exists in the crossing areas (See Figures 4 and 5).

In this alternative an approximately 120 foot reach of riparian habitat (the riparian habitat in the crossing areas) would be exposed to livestock impacts. The crossing areas would have concentrated impacts to vegetation, soils, aquatic habitat, bank stability and water quality due to cattle being confined to a narrow area. These impacts would lead to a localized reduction of vegetative cover within the crossing areas. Small amounts of sediment would also be expected to be released into the stream from use of the crossing areas by ungulates, though sedimentation downstream from the crossing areas would be expected to be minimal due to the limited amount of soils within the crossing areas and due to increases in vegetation cover which filters sediment in streams (McEldowney et al. 2002). Other ungulates such as elk and deer would continue to have access to the stream and riparian vegetation and would potentially still cause bank alteration, streambank erosion, and reduced plant vigor and cover in the proposed enclosure area (Opperman et al. 2000).

Livestock use of the unnamed tributary would likely increase if the proposed action were implemented due to a large area of the currently available Indian Creek being excluded from active grazing use. Depending on seasonality and water availability in the tributary, implementation of the proposed action would likely lead to localized reductions in woody and herbaceous vegetation cover, as well as increased livestock hoof action, which may increase sediment loading and reduce water quality in Indian Creek.

#### ***3.3.2.2 Special Status Species***

The proposed action would - reduce bank alteration due to livestock trampling, further reducing stream bank and soil erosion. As banks stabilize, the stream would likely develop deeper pools and more diverse channel characteristics which would improve habitat for Gila chub (ESA endangered), lowland leopard frog (BLM sensitive), longfin dace (BLM sensitive) and desert

sucker (BLM sensitive). Increased cover of riparian vegetation would improve nesting and foraging habitat for yellow-billed cuckoo (ESA threatened).

### ***3.3.2.3 Wildlife Resources, Migratory Birds and Fish***

As stream banks stabilize, the stream should develop deeper pools and more diverse channel characteristics, which would improve habitat for aquatic species. Increased cover of riparian vegetation would improve habitat for riparian dependent species which includes many migratory birds. This action could also increase water quality and quantity (Belsky et al 1999, Vindon et al. 2010). The proposed action should have little effect on the upland species in the area. Many of these species may come to Indian Creek to water. The fence would be built with a smooth wire on the bottom to allow wildlife, such as pronghorn, ease of access to water. The proposed action would likely have little effect on the upland wildlife species in the area. Many of these species may come to Silver Creek to water. The fence would be built with a smooth wire on the top and bottom to allow wildlife, such as pronghorn, ease of access to water.

The narrow crossing areas (a total length of approximately 120 feet) would have more concentrated impacts to vegetation, soils, aquatic habitat, bank stability and water quality. Habitat quality for riparian and aquatic species would be minimally reduced in the crossing areas due to areas already being hardened from bedrock and rock substrate.

Use of the unnamed tributary by livestock may temporarily displace wildlife while livestock are present. Also use of the unnamed tributary may result in degraded habitat conditions for riparian obligate species.

## ***3.3.3 Environmental Consequences of Alternative Two - Biological Resources***

### ***3.3.3.1 Riparian Resources***

The environmental consequences of Alternative Two would be the same as the Proposed Action with the exception of the impacts associated with the water development.

Diverting water from the unnamed tributary would reduce the amount of water available to riparian plants downstream of the diversion site. This could reduce the growth, survival potential and recruitment of native riparian obligate species in the unnamed tributary and in Indian Creek at, or immediately downstream of, the confluence with the tributary. Removing active livestock use from the riparian area would likely lead to increased water quality and less sedimentation (Belsky et al 1999, Vindon et al. 2010). Other ungulates such as elk and deer would continue to have access to the stream and riparian vegetation and would potentially still cause streambank alteration, erosion, and reduced plant vigor and cover in the proposed exclosure area (Opperman et al. 2000).

### *3.3.3.2 Special Status Species*

The environmental consequences of Alternative Two would be the same as the Proposed Action with the exception of the impacts associated with the water development. Diverting water from the unnamed tributary would reduce the amount of water available to lowland leopard frogs that occupy habitat in this tributary. This would reduce the quantity and quality of lowland leopard frog habitat downstream of the diversion structure. The water that is diverted to the trough would otherwise enter Indian Creek through surface or subsurface flow. This would reduce the availability of water in Indian Creek that could provide habitat to Gila chub. The portion of Indian Creek at and downstream of the confluence of the unnamed tributary becomes intermittent, holding water in some years and drying completely in other years. Input from this tributary source may be important to Gila chub in this segment of Indian Creek due to the marginal water availability.

### *3.3.3.3 Wildlife Resources, Migratory Birds and Fish*

The environmental consequences of Alternative two would be the same as the Proposed Action with the exception of the impacts associated with the water development. Diverting water from the unnamed tributary would reduce the amount of surface water available to wildlife downstream of the diversion. Water diversion would also impact wildlife habitat by reducing the amount water available to support plant establishment and growth. Riparian-wetland plants provide habitat for a variety of wildlife species, including nesting and foraging habitat for migratory birds such as the threatened yellow-billed cuckoo.

## ***3.3.4 Environmental Consequences of Alternative Three - Biological Resources***

### *3.3.4.1 Riparian Resources*

Impacts from this alternative are expected to be the same as the proposed action with the exception that the impacts due to the crossing areas would not occur (120 ft). Within the full livestock enclosure (an approximate 6,700 foot length of riparian and aquatic habitat) riparian vegetative cover should increase. Recruitment of riparian obligate trees should also increase. With an increase of vegetative cover stream banks would become more stable, reducing erosion, slowing water during high-stream flow events, and building floodplains. This alternative would also reduce bank alteration due to livestock trampling, further reducing stream bank erosion. As banks become more stable, the stream should develop deeper pools and more diverse channel characteristics. This alternative would likely improve water quality through increases in vegetation and riparian resources to filter sediment and contaminants ((Belsky et al 1999, Vindon et al. 2010). Other ungulates such as elk and deer would continue to have access to the stream and riparian vegetation and would potentially still cause streambank alteration, erosion, and reduced plant vigor and cover in the proposed enclosure area (Opperman et al. 2000).



#### *3.3.4.2 Special Status Species*

With an increase of vegetative cover, stream banks would become more stable, reducing erosion, slowing water during high-stream flow events, and building floodplains. This alternative would also eliminate bank alteration due to livestock trampling, further reducing stream bank erosion. As banks become more stable, the stream should develop deeper pools and more diverse channel characteristics which would improve habitat for Gila chub (ESA endangered), lowland leopard frog (BLM sensitive), longfin dace (BLM sensitive) and desert sucker (BLM sensitive). Increased cover of riparian vegetation would improve nesting and foraging habitat for yellow-billed cuckoo (ESA threatened).

#### *3.3.4.3 Wildlife Resources, Migratory Birds and Fish*

This alternative would also eliminate bank alteration due to livestock trampling by an additional 120 ft, further reducing stream bank erosion. As banks become more stable, the stream should develop deeper pools and more diverse channel characteristics which would improve habitat for aquatic and riparian obligate species.

### *3.3.5 Environmental Consequences of Alternative Four - Biological Resources*

#### *3.3.5.1 Riparian Resources*

With the full removal of livestock from the Cross S and Bald Hill pastures, riparian vegetative cover would likely increase. Recruitment of riparian obligate trees would also increase. With an increase of vegetative cover, stream banks would become more stable, reducing erosion, slowing water during high-stream flow events, and building floodplains. As banks become more stable, the stream would develop deeper pools and more diverse channel characteristics. This alternative would likely improve water quality through increases in vegetation and riparian resources to filter sediment and contaminants (Belsky et al 1999, Vindon et al. 2010). Other ungulates such as elk and deer would continue to have access to the stream and would potentially contribute to increased streambank alteration, erosion, and reduced plant vigor and cover in the proposed closure area (Opperman et al. 2000).

#### *3.3.5.2 Special Status Species*

Impacts from this alternative are expected to be the same as the proposed action with the exception that the impacts due to the crossing areas would not occur. Both the Cross S and Bald Hill pastures would be excluded. Riparian vegetative cover should increase along the approximate 6,700 foot length of riparian and aquatic habitat. Recruitment of riparian obligate trees should also increase. With an increase of vegetative cover stream banks would become more stable, reducing erosion, slowing water during high-stream flow events, and building floodplains. This alternative would also eliminate bank alteration due to livestock trampling, further reducing stream bank erosion. As banks become more stable, the stream should develop deeper pools and more diverse channel characteristics which would improve habitat for Gila

chub (ESA endangered), lowland leopard frog (BLM sensitive), longfin dace (BLM sensitive) and desert sucker (BLM sensitive). Increased cover of riparian vegetation would improve nesting and foraging habitat for yellow-billed cuckoo (ESA threatened). Sediment from the uplands impacting riparian dependent species status species should be least in alternative 4. Upland vegetation should increase in the uplands which should trap more sediment.

### *3.3.5.3 Wildlife Resources, Migratory Birds and Fish*

Impacts from this alternative are expected to be the most beneficial to wildlife. Impacts to riparian obligate species and the habitat they depend upon is similar to proposed alternative with the exception that the impacts due to the crossing areas would not occur. Additionally, upland species and the habitat they depend upon would improve as a result of cattle exclusion in the upland portions of the pastures. No additional fence would constructed, thus improving ingress and egress of large wildlife across the landscape relative to the proposed action.

Within both pastures, (an approximate 6,700 foot length of riparian and aquatic habitat) riparian vegetative cover should increase. Upland vegetation should also increase in the nearly 1,400 acre Bald Hill and Cross S pastures. Recruitment of both riparian obligate trees and upland vegetation should increase. With an increase of vegetative cover stream banks would become more stable, reducing erosion, slowing water during high-stream flow events, and building floodplains. Livestock would be removed and bank alterations by livestock would be eliminated thus reducing stream bank erosion potential. As banks become more stable, the stream should develop deeper pools and more diverse channel characteristics which would improve habitat for aquatic and riparian obligate species. An increase in upland vegetation should improve upland hydraulic function, site stability and biotic integrity. This should result in higher quality habitat, more forage species, and a reduction of sediment affecting riparian dependent species.

### *3.3.6 Environmental Consequences of the No Action Alternative - Biological Resources*

#### *3.3.6.1 Riparian Resources*

In this alternative the entire reach (an approximate 6700 foot length of riparian habitat) would be exposed to livestock impacts during winter grazing season from November 1 through March1. . Riparian herbaceous and woody species vegetation utilization would continue throughout the permitted grazing season. Bank alteration due to livestock trampling would also continue throughout the winter grazing season. Relative to the Proposed Action these combined impacts would result in reduced vegetative cover, reduced recruitment of riparian trees, reduced bank stability and increased erosion. Proper functioning condition (PFC) would continue to function at risk with an upward trend. The concentrated impacts in the crossing area(s) analyzed in the Proposed Action section would not occur. Impacts to riparian vegetation and streambank alteration and trampling from ungulate wildlife would continue to occur under this alternative.

### *3.3.6.2 Special Status Species*

In this alternative the entire reach (an approximate 6700 foot length of riparian and aquatic habitat) would be exposed to livestock impacts during winter grazing season from November 1 through March 1. Relative to the Proposed Action these combined impacts would result in reduced vegetative cover and nesting habitat for yellow-billed cuckoo (ESA threatened). Relative to the Proposed Action these impacts would increase erosion of stream banks and increase the suspended sediment load in the stream, reducing habitat quality and water quality for Gila chub (ESA endangered), lowland leopard frog (BLM sensitive), longfin dace (BLM sensitive) and desert sucker (BLM sensitive). The concentrated impacts in the crossing areas analyzed in the Proposed Action section above would not occur.

### *3.3.6.3 Wildlife Resources, Migratory Birds and Fish*

Relative to the proposed action riparian vegetation would receive more impact through herbaceous and woody riparian species use during winter grazing season from November 1 through March 1. Riparian and aquatic obligate wildlife such as fish, amphibians, garter snakes, and many species of migratory birds would have greater impacts to their habitat. Aquatic habitat would be more impacted through trampling, hoof shear on stream banks, and increased suspended sediment loads. The concentrated impacts in the crossing areas analyzed in the Proposed Action section above would not occur. No additional fence would be installed as proposed in the proposed action.

## **3.4 Rangeland Management**

### *3.4.1 Affected Environment*

As noted in the Introduction section of this EA, the Box Bar Allotment is a cattle grazing allotment located within the Agua Fria National Monument (Figure 1.). There is 2,447 Animal Unit Months (AUMs) authorized for the Box Bar Allotment from March 1 to Feb 28 on a year round basis. The lessee is authorized to have 206 head of cattle on the allotment (including cow/calf pairs). Land ownership of the allotment is comprised of mostly BLM lands (84%) followed by State of Arizona lands (15%) and then private lands (<1%) (Figure 1). The BLM portions of the allotment are grazed in accordance with the Agua Fria National Monument Resource Management Plan (RMP, BLM 2010) and the 2006 Box Bar Allotment Management Plan (AMP) (AZ-230-2007-001). The Box Bar Allotment Management plan calls for upland utilization standards not to exceed 40% on key forage species. The AMP also calls for one season of rest in upland pastures after two consecutive uses. The AFNM RMP calls for no hot season use of riparian areas, which implies a season of use from November 1 to March 1 yearly in riparian areas. No livestock use is authorized in any riparian area within the AFNM outside of those dates. The Indian Creek riparian area is a relatively small portion of the Box Bar Allotment, but plays a pivotal role in the management of the Cross S and Bald Hill pastures.

### ***3.4.2 Environmental Consequences of the Proposed Action – Rangeland Management***

The Proposed Action would make livestock management in the Box Bar Allotment more efficient and easier for the lessee. Livestock would be able to use the upland portions of Cross S and Bald Hill pastures where the creek is located without any seasonal restrictions. Current management stipulations do not allow for flexibility in livestock use in the upland portions of the Cross S or Bald Hill pastures. When riparian use criteria are met in the Indian Creek riparian area, livestock are removed by the lessee. This would provide the lessee flexibility for their livestock operation. Increased use of the upland portions of these pastures would also help with fuels and fire management within the allotment. The proposed water gaps would provide much needed water for livestock, while keeping the effects of livestock use within the riparian areas minimal. Increases in riparian vegetation may also increase water quality due to sediment filtration and the water holding capacity of the riparian area, creating more usable water for wildlife and livestock (McEldowney et al. 2002, Belsky et al. 1999). All of the costs associated with the Proposed Action would be paid for by the BLM through use of range improvement funds.

### ***3.4.3 Environmental Consequences of Alternative Two – Rangeland Management***

The environmental consequences of Alternative Two would be similar to the Proposed Action with the exception of the added water development. The added water development would reduce ungulate pressure on the Indian Creek riparian area by providing a water source outside of the riparian corridor. A new development would likely increase use and pressure on a small area around where the water development would be located. The water development would likely help the livestock lessee by providing a clean source of water for their livestock. All of the costs associated with this alternative would be paid for by the BLM through use of range improvement funds.

### ***3.4.4 Environmental Consequences of Alternative Three – Rangeland Management***

The environmental consequences of Alternative Three would be similar to the Proposed Action and Alternative Two, though the effects would likely impact the livestock grazing lessee by excluding their livestock from using the water located in the Indian Creek area. This would make managing livestock in the Cross S and Bald Hill pastures more difficult and likely impossible during years when water is unavailable in other areas. All of the costs associated with this Alternative would be paid for by the BLM through use of range improvement funds.

### ***3.4.5 Environmental Consequences of Alternative Four – Rangeland Management***

Administratively closing the Cross S and Bald Hill pastures would remove a total 1,933 BLM administered acres from the Box Bar Allotment. This would reduce the active AUMs by 464 from 2,447 to 1,983 (Cross S = 253 Bald Hill = 211). This Alternative would cause the lessee to reduce their herd by 39 animals from 206 head to 167 head (including cow/calf pairs). This would likely cost the lessee \$40,000 to 60,000 a year in lost revenue depending on beef market

prices and ranch operational costs (Holechek et al. 2004). This Alternative would likely make management of livestock easier in the Box Bar Allotment because there would be fewer animals to manage.

### ***3.4.6 Environmental Consequences of the No Action Alternative – Rangeland Management***

Relative to the Proposed Action, upland forage availability for livestock grazing would decrease due to the season of use restriction on the pastures that contain Gila chub critical habitat. Under current management as authorized by Biological Opinion 02-21-05-F-0409, the Bald Hill pasture (approximately 879 acres) and the Cross S pasture (approximately 1,054 acres) are closed to grazing between March 1 and October 31 of each year or until impact thresholds are met. Riparian impact thresholds are routinely met or exceeded within a few weeks of grazing, leading to the closure of the entire Bald Hill and Cross S pastures, not just the narrow band of riparian habitat along Indian Creek. In this alternative, riparian forage availability would continue throughout the grazing season (or until the impact thresholds are met) along the approximate 1.3 mile reach of Indian Creek.

## **4. CUMULATIVE EFFECTS**

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### **4.1 Cumulative Effects Study Area**

The area studied for cumulative effects includes the full length of the stream that is proposed for enclosure and the immediate surrounding area.

### **4.2 Cumulatively Connected Actions**

#### ***4.2.1 Past and Present Actions***

Human recreation (including camping, hiking, and hunting) and livestock grazing would likely continue to occur within close proximity to the Indian Creek riparian area. Wildfires would also likely continue to occur and could potentially have impacts to Indian Creek (e.g. sedimentation).

#### ***4.2.2 Reasonably Foreseeable Future Actions***

The BLM would likely continue to allow livestock grazing and other multiple use activities within the Box Bar and other allotments within close proximity to the Indian Creek riparian area. Use of the Indian Creek area would likely be minimal. The BLM is working with the Arizona Game and Fish Department and Forest Service (and other stakeholders and partners) on a Coordinated Resource Management Plan (CRMP) for the Horseshoe Allotment on BLM land and the Copper Creek Allotment on adjacent U.S. Forest Service land. The CRMP has identified stringent requirements for riparian use by livestock in riparian areas, including the portion of Indian Creek that falls within the Horseshoe Allotment. Ongoing projects through the CRMP would likely improve riparian habitat within Indian Creek and the Horseshoe Allotment within the AFNM.

Table 6. Cumulative impacts to biologic resources for each alternative.

Alternative	Length of Critical Habitat Exposed to Livestock (ft.)	Length of New Fence Constructed (miles)	Impacts
Proposed Action (Exclosure with crossings areas)	120	1.6	If riparian exclosures with crossings are constructed within the Indian Creek riparian area, as proposed, there would be combined beneficial impacts to riparian vegetation and, by extension, to wildlife habitat. This would likely allow the system to stabilize and regrow enough vegetation to armor itself against future grazing use by wildlife and potentially livestock. Water quality and quantity would also likely increase. However, cumulatively, there would be more linear miles of fence across the landscape which may impact the ingress and egress of large game species to and from the riparian area. Fencing would be built to minimize impacts to wildlife. Livestock use of the unnamed tributary would likely increase under this alternative.
Alternative Two (Same as Proposed but with the addition of the water development)	120	1.6	Cumulative impacts would be similar to the Proposed Action. However, if additional surface water was pumped from Indian Creek on nearby allotments, there may be a year round reduction in the amount of surface water available in the tributary and in Indian Creek critical habitat at, and downstream of, the tributary.
Alternatives Three (Exclosure with no crossing areas)	0	1.2	Cumulative impacts would be similar to the Proposed Action but with a slightly larger effect
Alternative Four (Administratively closing pastures that have access to critical habitat)	0	0	Cumulative impacts would be similar to the Proposed Action, but with a greater chance for recovery in the proposed crossing areas. There would be less fence constructed which is an improvement to the ingress and egress of large game species to the area.
Alternative Five (No Action)	6,700	0	Recovery of riparian resources within the monument would not be expected to be as pronounced since the entire proposed project area would be exposed to cattle grazing 4 months/year or until threshold impact levels are met. There would be less fence constructed, which is an improvement to the ingress and egress of large game species to the area.

## **5. PARTIES CONSULTED**

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US Fish and Wildlife Service

Willie Kelton, Box Bar Allotment Lessee

Arizona Game and Fish Department

## **6. LIST OF PREPARERS**

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Casey Addy, Natural Resource Specialist

Codey Carter, Wildlife Biologist

Bryan Lausten, Archaeologist

Paul Sitzmann, Wildlife Biologist

Gloria Tibbetts, Planning and Environmental Coordinator

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